

**IN THE CLAIMS:**

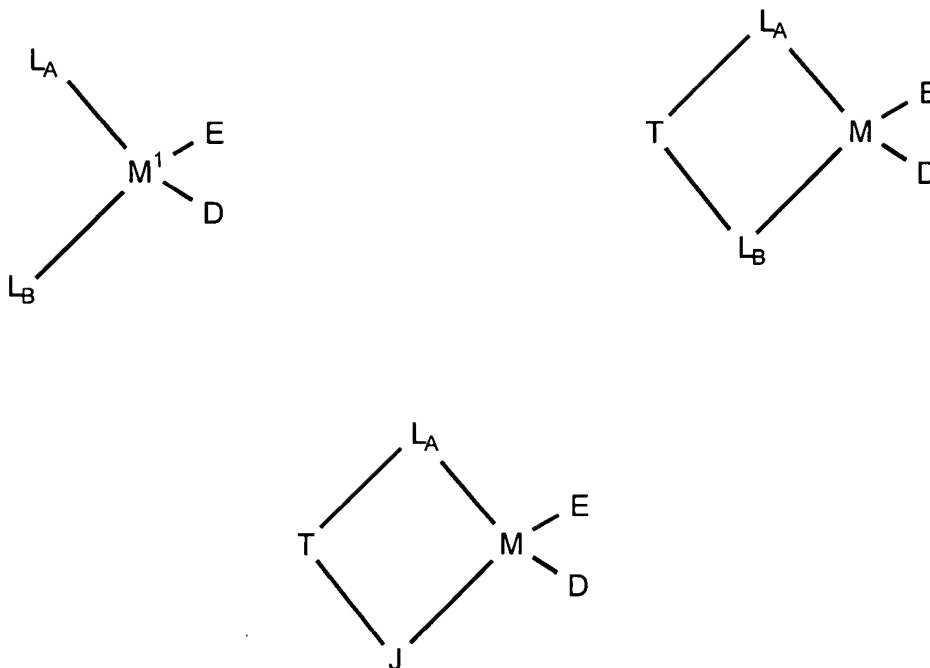
Please amend the claims as follows:

Claims 1-11. (Cancelled).

12. (Currently amended) The composition of ~~Claim 1~~ Claim 23 wherein the at least one monomer comprises styrene, vinyl styrene, an alkyl styrene, isobutylene, isoprene, or butadiene.
13. (Original) The composition of Claim 12 wherein the one or more monomers comprise styrene.

Claims 14-22. (Cancelled).

23. (Currently amended) A composition comprising a bifunctional metallocene catalyst comprising the product of two or more catalyst precursors and at least one monomer ~~in the presence of a free radical initiator~~, wherein the monomer is polymerizable by free-radical polymerization, and wherein the catalyst precursors are represented by at least one of the formulas:



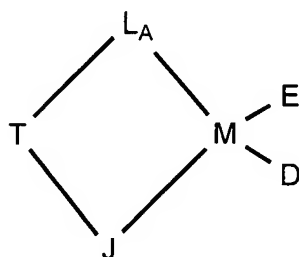
wherein

- (a) each M is a Group 4 metal;  
each M<sup>1</sup> is Group 4 metal;
- (b) L<sub>A</sub> is a substituted, cyclopentadienyl or heterocyclopentadienyl ligand connected to M or M<sup>1</sup> wherein L<sub>A</sub> comprises R;
- (c) L<sub>B</sub> is a ligand as defined for L<sub>A</sub> but selected independently of L<sub>A</sub>;
- (d) T is a bridging group that connects L<sub>A</sub> and L<sub>B</sub> or that connects L<sub>A</sub> and J and comprises a Group-13-to-16 element and 0-2 of R';
- (e) D and E are the same or different abstractable ligands, and
- (f) J is a heteroatom ligand comprising a Group-14-15 atom and 0-2 of R",

wherein each R, R', and R" are independently hydrogen or a hydrocarbonyl group provided at least one of R, R', and R" can be polymerized by a free radical initiator, provided that when M<sup>1</sup> is Zr, L<sub>A</sub> is substituted at more than one carbon atom, and wherein the two or more catalyst precursors each have a different Group 4 metal.

24. (Previously presented) A composition comprising the product of combining, in the presence of a free radical initiator, a catalyst precursor and at least one monomer in the

~~presence of a free radical initiator~~, wherein the monomer is polymerizable by free-radical polymerization, and wherein the catalyst precursor is represented as follows:

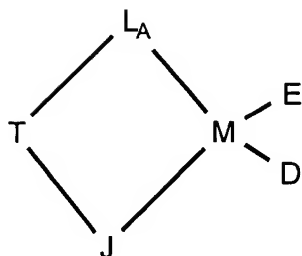
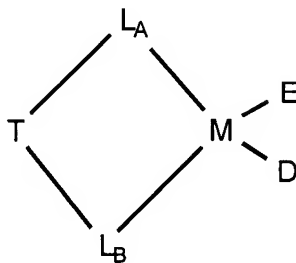


wherein

- (a) M is a Group 4 metal;
  - (b)  $L_A$  is a substituted or unsubstituted, cyclopentadienyl or heterocyclopentadienyl ligand connected to M, wherein  $L_A$  comprises R;
  - (c) J is a heteroatom ligand comprising a Group-14-15 atom and 0-2 of R";
  - (d) T is a bridging group that connects  $L_A$  and  $L_B$  and comprises a Group-13-to-16 element and 0-2 of R'; and
  - (e) D and E are the same or different abstractable ligands,  
wherein each R, R', and R" are independently hydrogen or a hydrocarbyl group provided at least one of R, R', and R" can be polymerized by a ~~the~~ free radical initiator.
25. (Previously presented) The composition of Claim 24 wherein the at least one monomer comprises styrene, vinyl styrene, an alkyl styrene, isobutylene, isoprene, or butadiene.
  26. (Previously presented) The composition of Claim 24 wherein the one or more monomers comprise styrene.
  27. (Previously presented) The composition of Claim 24 wherein the free radical initiator is selected from the group consisting of azo initiators and peroxides.
  28. (Previously presented) The composition of Claim 24, wherein M is zirconium.
  29. (Previously presented) The composition of Claim 24, wherein M is titanium.

Claims 30-43. (Cancelled).

44. (Currently amended) A composition comprising the product of a catalyst precursor and at least one monomer ~~in the presence of a free radical initiator~~, wherein the monomer is polymerizable by free-radical polymerization, and wherein the catalyst precursor is represented by one of the formulas:



wherein

- (a) M and M<sup>1</sup> are titanium;
- (b) L<sub>A</sub> is a substituted cyclopentadienyl or heterocyclopentadienyl ligand connected to M or M<sup>1</sup> wherein L<sub>A</sub> comprises R;
- (c) L<sub>B</sub> is a ligand as defined for L<sub>A</sub> but selected independently of L<sub>A</sub>;
- (d) T is a bridging group that connects L<sub>A</sub> and L<sub>B</sub> and comprises a Group-13-to-16 element and 0-2 1-2 of R';
- (e) D and E are the same or different abstractable ligands; and
- (f) J is a heteroatom ligand comprising a Group-14-15 atom and 0-2 of R",

wherein R and R' are independently hydrogen or a hydrocarbyl group provided at ~~least one of R and R' comprise~~ R' comprises at least one unsaturated double bond that can be polymerized by a ~~the~~ free radical initiator.

45. (Previously presented) The composition of Claim 44 wherein R and R' are independently hydrogen or a C<sub>1</sub>-C<sub>50</sub> hydrocarbyl group.
46. (Previously presented) The composition of Claim 44 wherein R and R' are independently hydrogen or a C<sub>1</sub>-C<sub>20</sub> hydrocarbyl group.
47. (Previously presented) The composition of Claim 44 wherein each R is independently one of hydrogen, allyl, methyl, or a phenyl group.
48. (Previously presented) The composition of Claim 44 wherein the abstractable ligands are independently hydride radicals; hydrocarbyl radicals; or hydrocarbyl-substituted organometalloid radicals.
49. (Previously presented) The composition of Claim 44 wherein two of the abstractable ligands join to form a 3-to-40-atom metallacycle ring.
50. (Previously presented) The composition of Claim 44 wherein the abstractable ligands are independently halogen, alkoxide, aryloxy, amide, or phosphide radicals.
51. (Previously presented) The composition of Claim 44 wherein the abstractable ligands are chloride, bromide, iodide, methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl, hexadecyl, heptadecyl, octadecyl, nonadecyl, eicosyl, heneicosyl, docosyl, tricosyl, tetracosyl, pentacosyl, hexacosyl, heptacosyl, octacosyl, nonacosyl, triacontyl, hydride, phenyl, benzyl, phenethyl, tolyl, methoxy, ethoxy, propoxy, butoxy, dimethylamino, diethylamino, methylethylamino, phenoxy, benzoxy, allyl, 1,1-dimethyl allyl, 2-carboxymethyl allyl, acetylacetonate,

1,1,1,5,5,5-hexa-fluoroacetylacetonate, 1,1,1-trifluoro-acetylacetonate, or 1,1,1-trifluoro-5,5-di-methylacetylacetonate radicals.

52. (Previously presented) The composition of Claim 44 wherein the free radical initiator is selected from the group consisting of azo initiators and peroxides.
53. (Previously presented) The composition of Claim 44 wherein the free radical initiator is selected from the group consisting of 2,2'-azobis(2-methylpropanenitrile), 1,1-azobis(1-cyclohexanenitrile), 4,4'-azobis(4-cyanovaleric acid), triphenylmethy lazobenzene, di-t-butyl hyponitrite, dicumyl hyponitrite, dibenzoyl peroxide, didodecanoyl peroxide, diacetyl peroxide, diisopropyl ester, dicyclohexyl ester, cumyl hydroperoxide, t-butyl hydroperoxide, dicumyl peroxide, di-t-butyl peroxide, and hydrogen peroxide.
54. (Previously presented) The composition of Claim 44 wherein the at least one monomer comprises styrene, vinyl styrene, an alkyl styrene, isobutylene, isoprene, or butadiene.
55. (Previously presented) The composition of Claim 44 wherein the one or more monomers comprise styrene.
56. (Previously presented) The composition of Claim 23 wherein R and R' are independently hydrogen or a C<sub>1</sub>-C<sub>50</sub> hydrocarbyl group.
57. (Previously presented) The composition of Claim 23 wherein R and R' are independently hydrogen or a C<sub>1</sub>-C<sub>20</sub> hydrocarbyl group.
58. (Previously presented) The composition of Claim 23 wherein each R is independently one of hydrogen, allyl, methyl, or a phenyl group.
59. (Previously presented) The composition of Claim 23 wherein the abstractable ligands are independently hydride radicals; hydrocarbyl radicals; or hydrocarbyl-substituted organometalloid radicals.

60. (Previously presented) The composition of Claim 23 wherein two of the abstractable ligands join to form a 3-to-40-atom metallacycle ring.
61. (Previously presented) The composition of Claim 23 wherein the abstractable ligands are independently halogen, alkoxide, aryloxide, amide, or phosphide radicals.
62. (Previously presented) The composition of Claim 23 wherein the abstractable ligands are chloride, bromide, iodide, methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl, hexadecyl, heptadecyl, octadecyl, nonadecyl, eicosyl, heneicosyl, docosyl, tricosyl, tetracosyl, pentacosyl, hexacosyl, heptacosyl, octacosyl, nonacosyl, triacontyl, hydride, phenyl, benzyl, phenethyl, tolyl, methoxy, ethoxy, propoxy, butoxy, dimethylamino, diethylamino, methylethylamino, phenoxy, benzoxy, allyl, 1,1-dimethyl allyl, 2-carboxymethyl allyl, acetylacetonate, 1,1,1,5,5,5-hexa-fluoroacetylacetonate, 1,1,1-trifluoro-acetylacetonate, or 1,1,1-trifluoro-5,5-di-methylacetylacetonate radicals.
63. (Previously presented) The composition of Claim 23 wherein the free radical initiator is selected from the group consisting of azo initiators and peroxides.
64. (Previously presented) The composition of Claim 23 wherein the free radical initiator is selected from the group consisting of 2,2'-azobis(2-methylpropanenitrile), 1,1-azobis(1-cyclohexanenitrile), 4,4'-azobis(4-cyanovaleric acid), triphenylmethy lazobenzene, di-t-butyl hyponitrite, dicumyl hyponitrite, dibenzoyl peroxide, didodecanoyl peroxide, diacetyl peroxide, diisopropyl ester, dicyclohexyl ester, cumyl hydroperoxide, t-butyl hydroperoxide, dicumyl peroxide, di-t-butyl peroxide, and hydrogen peroxide.
65. (Previously presented) The composition of Claim 23 wherein the at least one monomer comprises styrene, vinyl styrene, an alkyl styrene, isobutylene, isoprene, or butadiene.

66. (Previously presented) The composition of Claim 23 wherein the one or more monomers comprise styrene.

Claims 67-78. (Cancelled).